

Patent

HANDHELD DEVICE FOR APPLYING DENTAL MATERIALS

Related Application

This application claims the benefit of
co-pending provisional patent application Serial No.
5 60/411,297, filed 17 September 2002.

Background of the Invention

The present invention relates generally to a
dental handpiece, and more specifically to a dental
handpiece adapted to apply dental material to a patient's
10 tooth or teeth and having removable sections.

Dental handpieces for dispensing dental
material are well known in the art. For example Charlton
(U.S. Patent No. 6,083,000) and Lewis (U.S. Patent No.
3,389,3468) are designed to distribute dental material in
15 a controlled fashion. Generally, a predetermined amount
of dental material is stored in a reservoir within the
handpiece and a longitudinally moving plunger pushes a
plug into the reservoir, dispensing the dental material
in a controlled fashion. The dental material may be
20 loaded directly within the reservoir or contained within
a capsule that is placed within the reservoir.

Although dental handpieces and disposable
capsules have become a convenient way to dispense a
controlled amount of dental material into a patient's
25 mouth, the handpieces do not necessarily provide the most

sterile environment. Though capsules of dental material can be measured for a single patient use, there still may be residue dental material in the handpiece itself after use. Especially when a corkscrew style plunger is used,
5 the handpiece may not be sufficiently cleaned or sterilized between consecutive patients. The dental material is not easily washed out of the devices, and one cannot be certain that the material has been completely removed.

10 For the foregoing reasons, there is a need for a device that will allow a dentist, hygienist, or a dental assistant to dispense a controlled amount of dental material into a patient's mouth in a manner that is efficient and hygienic.

15 **Summary of the Invention**

The present invention alleviates the above problem by disclosing a dental handpiece that is easily kept clean and sterile. The handpiece is designed generally to dispense prophylaxis paste or similar material in
20 a safe, sanitary manner.

The handpiece comprises a detachable shield that fits securely onto the body of the handpiece. The shield contains a conduit passing through the shield. At one end the conduit is in fluid communication with a
25 reservoir of dental material, and the opposing end of the conduit is in fluid communication with the area where the dental material will be dispensed. Once the shield has been used, it may be removed and discarded, or autoclaved if preferred. The disposable shield helps ensure that
30 residual dental material will not pass from one application to the next.

Along with the shield, the reservoir for the dental material contributes to the sanitary nature of the invention. The reservoir is adapted to receive a
35 cartridge of dental material having opposing ends. One

end of the capsule is in fluid communication with a conduit located in the shield, while the opposite end is in communication with a plunger. The plunger pushes the dental material through the reservoir so that the dental material may enter the conduit located in the shield. Because of the design of the reservoir, plunger, and the cartridge, the dental material has minimal contact with the walls of the reservoir, and the cartridge may be discarded after being used, thereby contributing to the overall sanitary features of the handpiece. Likewise, the design prevents dental material from coming in contact with any of the mechanical parts of the handpiece.

The plunger pushes the dental material through the conduit in the shield, allowing the material to exit at an area where a tooth is to be polished by a rotating polishing device, such as a prophyl cup.

The plunger can be operated manually, but is preferably driven by a drive mechanism located within the body of the handpiece. The plunger has a semi-helical design, which meshes with a gear or cog connected to the drive mechanism. The drive mechanism also drives the polishing device or other attachment located on the end of the handpiece. A reversible direction trigger controls the drive mechanism, allowing easy control of the handpiece. The drive mechanism is enclosed within the body of the handpiece and does not come into contact with the dental material.

The overall design allows for an efficient dental handpiece with improved sanitary operating conditions. Dental material will generally be completely removed after each application, and the mechanical features of the device will not come into contact with the dental material.

These and other advantages will become more

evident in the following description.

Description of the Drawings

Figure 1 is an exploded perspective view of an embodiment of the current invention.

5 Figure 2 is a perspective view of an embodiment of the current invention.

Figure 3 is a cutaway view of the invention shown in Figure 2.

10 Figure 4 shows a cutaway view of the present invention in use by a person.

Figure 5 shows a cutaway view of the present invention after a user has finished applying a dental material.

Detailed Description

15 Although the disclosure hereof is detailed and exact to enable those skilled in the art to practice the invention, the physical embodiments herein disclosed merely exemplify the invention that may be embodied in other specific structures. While the preferred
20 embodiment has been described, the details may be changed without departing from the invention, which is defined by the claims.

 Figure 1 shows an exploded view of a handpiece 9 in accordance with the present invention. The
25 handpiece 9 has a body 10 that allows a user to engage the handpiece 9. A removable shield 12 fits securely onto a front portion 11 of the body 10. A reservoir 14 sits on a back portion 13 of the body 10. The reservoir 14 and the body may be formed from one piece of material
30 or separate pieces. The reservoir 14 is in communication with a plunger 16 having a helical underside 18. The reservoir 14 will also contain a through cartridge 20 containing a dental material or prophylaxis paste 21. The cartridge 20 has a first end 22 and a second end 24. The
35 first end 22 can be sealed, while the second end 24 is

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generally open. The second end 24 may contain a removable cover (not shown) for when the cartridge 20 is not in use. A trigger device 26 is connected to the body 10 and can control the action of a polishing member 28.

5 An adaptor 30 allows the handpiece 9 to be powered from a power source, preferable an air source, but any suitable power source will be allowed (not shown).

Figure 2 shows a perspective view of the handpiece 9 of the present invention. The shield 12
10 fittingly sits on the front end 11 of the body 10 and protects the body 10 from undue splatter when the polishing member 28 is in use. The cartridge 20 fits securely between the reservoir 14 and the shield 12, with a portion of the cartridge 20 secured inside of the
15 reservoir 14. Generally, the cartridge 20 will be secured in the handpiece 9 before the shield 12 is secured on the handpiece 9. The opposing ends 22 and 24 are in fluid communication with the shield 12 and the reservoir 14, respectively. This communication can be
20 seen clearer in Figure 3.

Figure 3 is a sectional view of the handpiece 9. The shield 12 has a through conduit 32 having a proximal end 34 and a distal end 36. The distal end 36 is located near the polishing member 28 and allows an
25 exit for the dental material 21. The proximal end 34 is in fluid communication with the first end 22 of the cartridge 20. The proximal end 34 is sharpened so that it can pierce and penetrate the closed first end 22 of the cartridge 20. This ensures that the dental material
30 21 will only be delivered into the conduit 32 of the shield, rather into or onto the handpiece 9. As a safety measure, the proximal end 34 preferably does not extend past the end of the shield 12.

Still referring to Figure 3, the second end 24
35 of the cartridge 20 is secured within the reservoir 14.

The cartridge 20 is shown protruding out of the reservoir 14, but it is possible that the reservoir 14 would encompass most or the entire cartridge 20. The second end 24 is arranged so that it will be able to receive the plunger 16. The helical underside 18 of the plunger 16 is in contact with a threaded cog 44. The helical underside 18 meshes with the cog 44, and as the cog 44 turns, the plunger 16 is moved forward to engage the dental material 21 within the cartridge 20. If the plunger 16 is to be withdrawn, the cog 44 is rotated in the opposite direction and the plunger 16 moves backward. While the design of the plunger 16 allows it to move backward and forward without rotating, it is also conceivable that the plunger 16 may be designed to rotate.

Essentially a drive mechanism 38 drives the cog 44. The drive mechanism 38 consists of a main drive shaft 40, a motor 41, a main drive gear 42, a secondary drive shaft 46, and a secondary drive gear 47. The drive mechanism 38 receives power through the adaptor 30, which can be joined to any suitable power source. Ideally, the device is driven with air as a power source, but any suitable power source is allowable.

The motor 41 turns the main drive gear 42. The teeth of the main drive gear 42 mesh with the teeth of the secondary drive gear 47. The main drive gear 42 will turn, thereby rotating the secondary drive gear 47, causing the secondary drive shaft 46 to rotate, as well. The secondary drive shaft 46 turns the cog 44, thereby moving the plunger 16, as stated above.

The main drive shaft 40 is connected to the polishing means 28. As the motor 41 turns the main drive gear 42, the main drive shaft 40 is also turned, thereby spinning the polishing means 28. In a preferred embodiment, the polishing means 28 is a prophy cup. The

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handpiece 9 is designed so that the polishing means 28 and the plunger 16 are rotated or moved concurrently, thereby allowing the user to manipulate a single control to polish a patient's tooth.

5 Referring to Figures 4, 5, and 6, the handpiece 9 is shown engaged by a finger 48. The finger 48 makes contact with the trigger 26. The trigger is connected to and controls the motor 41, thereby controlling the drive mechanism 38. The trigger 26 allows
10 for both a forward and reverse direction of the drive mechanism 38. As shown in Figure 4, the drive mechanism 38 is activated by pulling the trigger 26 backwards toward the back portion 13 of the handpiece 9, allowing the plunger 16 to move forward and into the reservoir 14,
15 contacting the cartridge 20 of dental material 21. The dental material 21 passes through the conduit 32 and exits at the distal end 36 of the conduit 32. The dental material 21 can then be deposited on a tooth 50 (see Figure 6), which will be polished by the polishing means
20 28. If one wishes to stop the flow of dental material 21, one simply removes their finger from the trigger 26.

When the polishing is finished, the trigger 26 can be moved in the opposite direction towards the front portion 11 of the handpiece 9, as shown in Figure 5,
25 thereby causing the plunger 16 to withdraw from the reservoir 14 and the cartridge 20. The empty cartridge 20 may then be removed from the handpiece 9 and discarded. It is also possible that the plunger 16 may be designed so that one could manually disengage the
30 helical side 18 of the plunger 16 from the cog 44 and be removed from the reservoir 14 manually. The cartridge 20 and the shield 12 are then discarded, or autoclaved if desired. The result is a polished tooth 50 and a handpiece 9 without residual dental material 21 built up
35 on the handpiece 9.

While the drive mechanism 38 is described to control both the polishing means 28 and the plunger 16, it is foreseeable that they could be operated by separate controls. Also, if desired, the plunger 16 could be
5 operated manually rather than by a motor, and the movement of the plunger 16 could also control the polishing means 28 without use of a motor.

The foregoing is considered as illustrative only of the principles of the invention. Furthermore,
10 since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described. While the preferred embodiment has been described, the details may be changed
15 without departing from the invention, which is defined by the claims.